

Comparing Vasopressin 1A Receptor Density in Paired vs. Widowed Coyote Brains

Jacey Hopkin | Utah State University

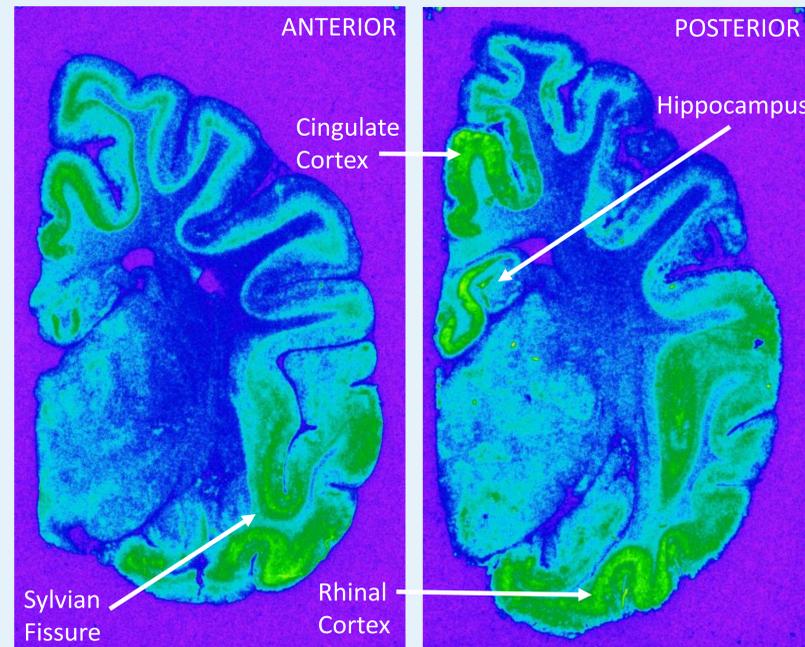
Faculty: Dr. Sara Freeman | Utah State University

Introduction

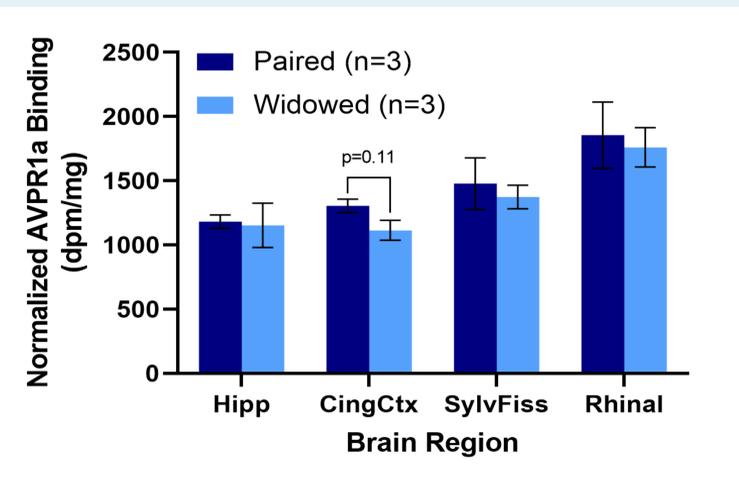
- Vasopressin (AVP) is a social neuropeptide, known for activating reward systems in several species when stimulated in social situations.
- There are higher levels of the AVP 1a receptor (AVPR1a) in the brains of monogamous animals over non-monogamous animals.
- When separated from their mate, monogamous prairie voles show a decrease in oxytocin, which is a structurally and functionally related neuropeptide hormone to AVP.
- AVPR1a binding has been studied in the forebrain structures of coyotes, but not in posterior areas.
- To understand the impact of pair mate loss, it is beneficial to study the social systems of the brains of monogamous animals like the coyote.
- Hypothesis: I hypothesize that there will be an overall decrease in AVPR1a binding in the deep-brain structures of widowed coyotes over the brains of paired coyotes.

Methodology

- Brains from 3 female widowed coyotes and 3 paired coyotes were opportunistically collected from coyotes euthanized at the USDA Millville Predator Research Center within 2-3 hours of death.
- Procured brains were immediately frozen and stored at -80°C . They were then sliced in a cryostat at a thickness of 20 microns and mounted on glass slides.
- Slides were run through an established autoradiography procedure, using ^{125}I -linearized vasopressin antagonist as the AVPR1a radioligand.
- The radioactive slides were exposed to radiosensitive film for 7d before film development. Films were imaged on a lightbox and radiation density across four regions of interest (plus background) was quantified using MCID Core digital densitometry software.
- Data was analyzed using a two-way repeated measures ANOVA and graphed using Prism 9.



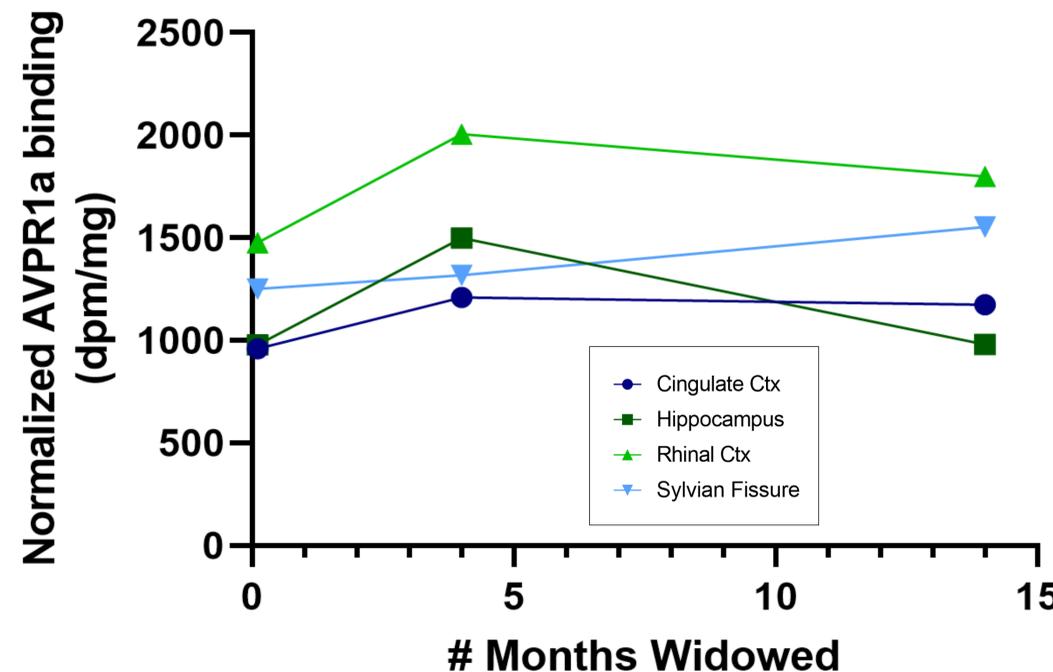
Results



Above: Though no findings reached statistical significance, a trend in AVPR1a binding was detected in the Cingulate Cortex which suggests that widowed coyotes may experience a reduction in AVPR1a density. **Below:** Brain region AVPR1a density as a function of time since loss.



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Conclusions & Future Research

- The cingulate cortex is involved in linking behavior with emotion and reward systems.
- The null hypothesis—that no difference between AVPR1a binding in paired v. widowed coyotes exists—could not be rejected.
- It is critical to note the small sample size in both samples.
- Future studies should follow up on the trend of AVPR1a binding in the cingulate cortex of paired vs. widowed coyotes.
- Future studies should investigate individual variation in AVPR1a binding between coyotes.
- Recent research has indicated that partner loss may result in neurotransmitter receptor plasticity, not density, so our expectation to see differences in average receptor levels may need to be revised.

References

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